IEEE BRAIN WORKSHOP on Advanced NeuroTechnologies

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PROGRAM AT-A-GLANCE

THURSDAY, OCTOBER 22, 2020

8:45 – 9:00 am ET
OPENING REMARKS

9:00 – 10:30 am ET
SYMPOSIUM #1 / Probing the Network: New Approaches for Studying Mechanisms of Target Engagement
Moderator / Paul Sajda
- Aaron Suminski, Examining Central Mechanisms of Target Engagement in Peripheral Nerve Neuromodulation
- Kristl Vonck, Personalized Neuromodulation Therapy in Drug Resistant Epilepsy Patients Treated with Vagus Nerve Stimulation
- Sarah "Holly" Hollingsworth Lisanby: Target Engagement in Mental Health: Challenges and Opportunities

10:30 – 11:00 am ET **Break**

11:00 am – 12:30 pm ET
SYMPOSIUM #2 / Next Generation Hardware: New Approaches to Stimulation and Recording at the Neural Interface
Moderator / Cindy Chestek
- John Rogers, Soft, Wireless Optoelectronic Systems for Neuroscience Research
- Polina Anikeeva, Modulating Neural Function with Magnetic Nanotransducers
- Silvestro Micera, i4LIFE: Intraneural Stimulation to Restore Sensory, Motor and Autonomic Neural Functions

12:30 – 1:30 pm ET **Break**
(Live Q&A with CorTec Experts, 12:45 – 1:15 pm ET)

1:30 – 2:30 pm ET
KEYNOTE / Robert Greenberg, MD, Ph.D.

FRIDAY, OCTOBER 23, 2020

9:00 – 10:00 am ET
KEYNOTE / Helen Mayberg, MD
Recovery Is Not Linear: Implications for Optimizing DBS for Depression

10:00 – 10:30 am ET **Break** (Live Q&A with Medtronic)

10:30 am – Noon ET
SYMPOSIUM #3 / Translational Neuroscience Trials: Early Clinical Data
Moderator / Erika Ross
- Alireza Gharabaghi, Perspectives of Brain Stimulation for Motor Restoration
- Monica Perez, Targeted Neuroplasticity for Recovery Following Spinal Cord Injury
- Mark George, Does Rhythm Matter in Using TMS for Treating Depression? New Data from Charleston

12:00 – 1:00 pm ET **Break**

1:00 – 2:30 pm ET
SYMPOSIUM #4 / Neural Data Science and Analytics
Moderator / Metin Akay
- Ritu Kapur, A Virtual Motor Exam for Parkinson's Disease: Frameworks for Remote Monitoring
- Sridevi Sarma, Towards Closed-loop Peripheral Nerve Stimulation for Chronic Pain: From Data to Models
- Sooyoon Shin, What Can We Do with Sensor Data? Insights from Discovery Through Delivery of Prescription Bioelectronics

2:30 – 3:00 pm ET **Break**

3:00 – 4:00 pm ET
INDUSTRY PANEL
- Chris Berka, Advanced Brain Monitoring
- Felix Deku, Neuralink
- Amy Kruse, Sattva Science
- Ana Maiques, Neuroelectrics
- Martha Morrell, NeuroPace
- Brian Pepin, Rune Labs

4:00 – 4:15 pm ET
BEST POSTER AWARD PRESENTATION AND CLOSING REMARKS

WORKSHOP CO-CHAIRS

Metin Akay

Metin Akay, Ph.D. is currently the founding chair of the new Biomedical Engineering Department and the John S. Dunn professor of biomedical engineering at the University of Houston. He received his B.S. and M.S. in Electrical Engineering from the Bogazici University, Istanbul, Turkey in 1981 and 1984, respectively and a Ph.D. degree from Rutgers University in 1990. He is also the President-Elect of the IEEE Engineering in Medicine and Biology (EMBS). Dr. Akay has edited several books, editing several special issues of prestigious journals, including the Proc of IEEE, and giving more than hundred keynote, plenary and invited talks at international conferences, symposiums and workshops regarding emerging technologies in biomedical engineering. He is the founding editor-in-chief of the Biomedical Engineering Book Series published by the Wiley and IEEE Press and the Wiley Encyclopedia of Biomedical Engineering. He is also the editor of the Neural Engineering Handbook published by Wiley/IEEE Press and served as the first steering committee chair of the IEEE Trans on Computational Biology and Bioinformatics. He established the Annual International Summer School on BIO-X sponsored by the NSF and the IEEE EMBS and served as the founding chair of the IEEE EMBS Special Topic Conference on Neural Engineering.

Dr. Akay is a recipient of the IEEE EMBS Early Career and Service awards as well an IEEE Third Millennium Medal and is a fellow of IEEE, the Institute of Physics (IOP), the American Institute of Medical Biological Engineering (AIMBE) and the American Association for the Advancement of Science (AAAS). His Neural Engineering and Informatics Lab is interested in developing an intelligent wearable system for monitoring motor functions in Post-Stroke Hemiplegic Patients and detecting coronary artery disease. In addition, his lab is currently investigating the effect of maternal nicotine and alcohol in fetus and newborns. His lab has also developed a novel Brain Chip for precision medicine as well as the detection of coronary occlusions.

Paul Sajda

Paul Sajda, Ph.D. is a Professor of Biomedical Engineering, Electrical Engineering and Radiology (Physics) at Columbia University. He is also a Member of Columbia's Data Science Institute and an Affiliate of the Zuckerman Institute of Mind, Brain and Behavior. He received a BS in electrical engineering from MIT in 1989 and an MSE and PhD in bioengineering from the University of Pennsylvania, in 1992 and 1994, respectively. Professor Sajda is interested in what happens in our brains when we make a rapid decision and, conversely, what processes and representations in our brains drive our underlying preferences and choices, particularly when we are under time pressure. His work in understanding the basic principles of rapid decision-making in the human brain relies on measuring human subject behavior simultaneously with cognitive and physiological state. Important in his approach is his use of machine learning and data analytics to fuse these measurements for predicting behavior and infer brain responses to stimuli. Professor Sajda applies the basic principles he uncovers to construct real-time brain-computer interfaces that are aimed at improving interactions between humans and machines. He is also applying his methodology to understand how deficits in rapid decision-making may underlie and be diagnostic of many types of psychiatric diseases and mental illnesses.

Professor Sajda is a co-founder of several neurotechnology companies and works closely with a range of scientists and engineers, including neuroscientists, psychologists, computer scientists, and clinicians. He is a fellow of the IEEE, AMBIE and AAAS and Chair of the IEEE Brain Initiative. He is also a recent recipient of the DoD's Vannevar Bush Faculty Fellowship (VBFF).

PROGRAM CO-CHAIRS

Cynthia Chestek

Cynthia A. Chestek, Ph.D. received the B.S. and M.S. degrees in electrical engineering from Case Western Reserve University in 2005 and the Ph.D. degree in electrical engineering from Stanford University in 2010. She was a postdoc at the Stanford Department of Neurosurgery with the Braingate 2 clinical trial. She is now an associate professor of Biomedical Engineering at the University of Michigan, Ann Arbor, MI, where she joined the faculty in 2012. She runs the Cortical Neural Prosthetics Lab, which focuses on brain and nerve control of finger movements as well as to high-density carbon fiber electrode arrays. She is the author of 49 full-length scientific articles. Her research interests include high-density interfaces to the nervous system for the control of multiple degree of freedom hand and finger movements.

Erika Ross

Erika Ross, Ph.D. is the Director of Applied Research at Abbott Neuromodulation, leading applied research strategy, external partnerships, portfolio, and execution. Applied research includes computational modeling, pre-clinical, feasibility, and clinical safety trials that feed new products and indications. Prior to her role at Abbott, Erika was the Neuroscience Director at Cala Health, a Stanford Biodesign incubated start-up that has been developing a non-invasive, digitally enabled neuromodulation solution for Essential Tremor patients.

She has held roles of increasing leadership at Cala Health as the company completed development and prepared for commercialization and played a major role in developing their digital health architecture and team. Prior to Cala Health, Erika held the roles of Assistant Professor of Neurologic Surgery and Deputy Director of the Surgical Device Innovation Accelerator at the Mayo Clinic in Rochester, Minnesota where she developed invasive and non-invasive solutions to unmet needs in the neuromodulation and other surgical practice areas.

SPEAKERS / KEYNOTE

KEYNOTE #1 / Robert Greenberg, MD, Ph.D.

Co-founder and former CEO and Chairman of the Board of Second Sight Medical Products, Inc. (NASDAQ: EYES) in Los Angeles, California. Dr. Greenberg is a leader in the field of neural prosthetics – having developed and brought to market the world's most advanced implantable neural stimulator, the Argus II visual prostheses, to treat retinitis pigmentosa, a form of blindness.

Dr. Greenberg was also a medical reviewer at the FDA's Office of Device Evaluation. Dr. Greenberg is the recipient of numerous honors and awards, has over 260 issued US patents and over 100 international patents, and has published over 60 articles. He received MD and PhD degrees from the Johns Hopkins School of Medicine in Baltimore, Maryland. Dr. Greenberg joined AMF in 2004 as Chairman of the Board of Directors.

KEYNOTE #2 / Helen Mayberg, MD

Helen Mayberg, MD is Professor of Neurology, Neurosurgery, Psychiatry and Neuroscience, and the Mount Sinai Professor in Neurotherapeutics at the Icahn School of Medicine where she serves as the founding Director of the Center for Advanced Circuit Therapeutics. Dr. Mayberg was recruited to New York after 14 years at Emory University in Atlanta where she was Professor of Psychiatry, Neurology and Radiology and the Dorothy Fuqua Chair in Psychiatry Neuroimaging and Therapeutics. Her research has characterized neural systems mediating major depression and its recovery, defined imaging-based illness subtypes to optimize treatment selection, and introduced the first use of deep brain stimulation for treatment resistant patients.

Dr. Mayberg received a BA in Psychobiology from UCLA and a MD from University of Southern California, and then completed her neurology residency at the Neurological Institute of New York, and fellowship training in nuclear medicine at Johns Hopkins. She is a member of the National Academy of Medicine, the National Academy of Arts and Sciences, and the National Academy of Inventors, and has authored more than 200 publications, and participates in a wide variety of advisory and scientific activities across multiple fields in neuroscience.

SPEAKERS / SYMPOSIUM #1

Probing The Network: New Approaches For Studying Mechanisms of Target Engagement

Aaron Suminski, Ph.D. is a Senior Scientist, Department of Neurological Surgery at the University of Wisconsin-Madison. He is also a founding member and Associate Director of the Wisconsin Institute for Translational Neuroengineering (WITNe). He received his B.S. in Biomedical Engineering from Milwaukee School of Engineering in 2000 and Ph.D. in Biomedical Engineering from Marquette University and the Medical College of Wisconsin in 2006. He completed his postdoctoral training at the University of Chicago, where he investigated how changes sensory feedback shape the activity of neural populations in primary motor cortex (MI) during natural movement and neuroprosthetic control. Aaron arrived at UW-Madison in 2016 where his lab focuses on understanding how neuromodulation of the central and peripheral nervous system modulates neural activity both in close proximity to the stimulating electrodes and in neural circuits receiving projections from the site of stimulation.

Kristl Vonck, MD, Ph.D. is Head of the Department 'Head and Skin' at Ghent University in Belgium. She was trained at Guy's Hospital, London, UK; Yale University School of Medicine, New Haven, Connecticut, USA and the University of Stellenbosch, South Africa. She is a fellow of the EAN and member of the EU Joint Task Force of the International League Against Epilepsy. She is a founding member of the international Neuro-modulation Task Force for COVID-19. Her research interests include epilepsy, neuromodulation, bioelectronic medicine and neurophysiological home-monitoring of neurological disorders. In the translational research setting of the 4Brain Research team, her team investigates the mechanism of action, efficacy and side effects of several neurostimulation modalities. Both in animals and patients, crucial questions are investigated for the application of neurostimulation as a valuable treatment option for neurological disorders: stimulation parameters, open and closed loop neurostimulation applications, seizure detection and prediction algorithms, invasive versus non-invasive neurostimulation. Proof-of-concept and early innovative techniques for neurological monitoring@home are validated at the excellence Center for Neurofysiological Monitoring (CNM) of Ghent University Hospital before being investigated in a home environment. Kristl Vonck has published widely in international peer-reviewed journals >150 papers), has authored seven book chapters and has given 190 international presentations.

Sarah "Holly" Hollingsworth Lisanby, MD, an internationally renowned innovator of neuromodulation technologies, is Director of the Division of Translational Research at the National Institute of Mental Health (NIMH), which funds research supporting the discovery of preventions, treatments, and cures for mental illness across the lifespan. She founded and directs the Noninvasive Neuromodulation Unit in the NIMH Intramural Research Program, a pioneering translational research program specializing in the use of brain stimulation tools to measure and modulate neuroplasticity to improve mental health. Previously, she held the JP Gibbons Endowed Professorship with Tenure and was the first woman to serve as Chair of the Duke University Department of Psychiatry. She founded and directed both the Duke University and the Columbia University Divisions of Brain Stimulation, where she built interdisciplinary research programs specializing in the convergence of Psychiatry, Neuroscience and Engineering. She co-led the NIH BRAIN Initiative Team focused on large-scale neural recording and modulation devices. Dr. Lisanby's laboratory has been continuously federally funded for over 20 years. She has been principal investigator on a series of NIH and DARPA funded studies on the development of novel neuromodulation technologies, including studies on the rational design of magnetic and electrical seizure therapies. Her team pioneered magnetic seizure therapy (MST) as a novel depression treatment from the stages of animal testing, first-in-human, and now international trials. A prolific author with over 280 scientific publications, she has received national and international recognition, including the Distinguished Investigator Award from the National Alliance for Research on Schizophrenia and Depression (NARSAD), the Max Hamilton Memorial Prize of the Collegium Internationale Neuro-Psychopharmacologicum (CINP), the Gerald Klerman Award from the National Depression and Manic Depression Association (NDMDA), and the Eva King Killam Research Award from the American College of Neuropsychopharmacology (ACNP). Dr. Lisanby served on the FDA Neurological Devices Advisory Panel and has held key leadership positions in professional organizations including serving as President of the International Society for ECT and Neurostimulation and Chair of the American Psychiatric Association Task Force to Revise the Practice on Electroconvulsive Therapy (ECT). A Board Certified Psychiatrist, Dr. Lisanby received her dual BS in Mathematics and Psychology and her MD at Duke University.

SPEAKERS / SYMPOSIUM #2

Next Generation Hardware: New Approaches to Stimulation and Recording at the Neural Interface

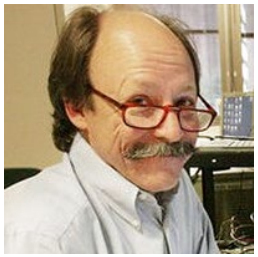
Polina Anikeeva, Ph.D. is an Associate Professor of Materials Science and Engineering and Brain and Cognitive Science at MIT. She is also an investigator at the McGovern Institute for Brain Research and an Associate Director of the Research Laboratory of Electronics. She received her BS in Physics from St. Petersburg State Polytechnic University in 2003 and her Ph.D. in Materials Science from MIT in 2009. She completed her postdoctoral training at Stanford, working on devices for optical stimulation and recording from neural circuits. In 2011, Polina joined faculty at MIT, where her lab now focuses on the development of minimally invasive materials and devices for neural recording, stimulation, and repair. Polina is a recipient of NSF CAREER Award, DARPA Young Faculty Award, the TR35, and 2018 Vilcek Prize for Creative Promise.

Silvestro Micera, Ph.D. is currently Professor of Bio-electronics at the Scuola Superiore Sant'Anna and Ecole Polytechnique Fédérale de Lausanne where he is holding the Bertarelli Foundation Chair in Translational Neuro-Engineering. He received the University degree (Laurea) in Electrical Engineering from the University of Pisa, in 1996, and the Ph.D. degree in Biomedical Engineering from Scuola Superiore Sant'Anna, in 2000. From 2000 to 2009, he has been an Assistant Professor of BioRobotics at the Scuola Superiore Sant'Anna. In 2007, he was a Visiting Scientist at the MIT with a Fulbright Scholarship. From 2008 to 2011 he was the Head of the Neuroprosthesis Control group and Adjunct Professor at the Institute for Automation, Swiss Federal Institute of Technology. In 2009, he was the recipient of the "Early Career Achievement Award" of the IEEE Engineering in Medicine and Biology Society. Dr. Micera's research interests include the development of neuroprostheses based on the use of implantable neural interfaces with the central and peripheral nervous systems to restore sensory and motor function in disabled persons. He is author of more than 300 WoS peer-reviewed papers and several international patents. He is currently Associate Editor of *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, *IEEE Transactions on Medical Robotics and Bionics* and *IEEE Open Journal Biomedical Engineering*. He is also a member of the editorial boards of the Journal of Neuroengineering and Rehabilitation, Journal of Neural Engineering, and Scientific Reports.

John A Rogers, Ph.D. obtained BA and BS degrees in chemistry and in physics from the University of Texas, Austin, in 1989. From MIT, he received SM degrees in physics and in chemistry in 1992 and the PhD degree in physical chemistry in 1995. From 1995 to 1997, Rogers was a Junior Fellow in the Harvard University Society of Fellows. He joined Bell Laboratories as a Member of Technical Staff in the Condensed Matter Physics Research Department and served as Director of this department. He spent thirteen years on the faculty at University of Illinois, most recently as the Swanlund Chair Professor and Director of the Seitz Materials Research Laboratory. In the Fall of 2016, he joined Northwestern University as the Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering and Medicine, with affiliate appointments in Mechanical Engineering, Electrical and Computer Engineering and Chemistry, where he is also Director of the recently endowed Querrey Simpson Institute for Bioelectronics. He has published more than 750 papers, is a co-inventor on more than 100 patents and he has co-founded several successful technology companies. His research has been recognized by many awards, including a MacArthur Fellowship, the Lemelson-MIT Prize, the Smithsonian Award for American Ingenuity in the Physical Sciences, the MRS Medal and most recently the Benjamin Franklin Medal from the Franklin Institute. He is a member of the National Academy of Engineering, the National Academy of Sciences, the National Academy of Medicine, the National Academy of Inventors and the American Academy of Arts and Sciences.

SPEAKERS / SYMPOSIUM #3

Translational Neuroscience Trials: Early Clinical Data



Mark George, MD first began studying the relationship between mind and brain, or brain/behavior relationships as an undergraduate philosophy student at Davidson College. He has continued this interest throughout his career with a focus on using brain imaging and brain stimulation to understand mood regulating circuits and how they go awry in depression and then using this knowledge to devise new treatments. He received his medical degree from the Medical University of South Carolina in Charleston in 1985, where he continued with dual residencies in both neurology and psychiatry and is board certified in both. Following his residency training. he worked for one year (1990-91) as a Visiting Research Fellow in the Raymond Way Neuropsychiatry Research Group at the Institute of Neurology, Queen Square in London. He then moved to Washington, DC, working with Dr. Robert Post in the Biological Psychiatry Branch of the Intramural National Institute of Mental Health (NIMH). During his 4 years at NIMH he was one of the first to use functional imaging (particularly oxygen PET) and discovered that specific brain regions change activity during normal emotions. This led to work using imaging to understand brain changes that occur in depression and mania. This imaging work directly led to his pioneering use of a non-invasive brain stimulation method, transcranial magnetic stimulation (TMS), as a probe of neuronal circuits regulating mood, and to clinical trials using TMS as an antidepressant. In 1993 while at the NIMH, he discovered that daily prefrontal rTMS over several weeks could treat depression and ever since he has worked to grow the science of TMS, both in terms of how it works in the brain, and in critically evaluating its therapeutic applications, especially in the area of treating depression. In June 1998 at MUSC, he also helped pioneer another new treatment for resistant depression, vagus nerve stimulation (VNS); FDA approved in 2006. Most recently he was the PI on an international trial that resulted in TMS being FDA approved to help with smoking cessation. Dr. George is a world expert in brain imaging and brain stimulation, particularly combining the two. Clinically he is an expert on depression and several other neuropsychiatric disorders. He is the editor-in-chief of a new journal he launched with Elsevier in 2008 called, *Brain Stimulation: Basic, Translation and Clinical Research in Neuromodulation*. He served as the chief editor for 13 years now and this journal is the top in its field. He has been continuously funded by NIH and other funding agencies since his fellowships. He has received both a NARSAD Young Investigator and Independent Investigator Award to pursue TMS research in depression. He has received numerous international awards including the NARSAD Klerman Award (2000), NARSAD Falcone Award (2008) and the Lifetime Achievement Award (2007) given by the World Federation of Societies of Biological Psychiatry (WFSBP). He is on several editorial review boards and NIH study sections, has published over 500 scientific articles or book chapters, and has written or edited 6 books.

Alireza Gharabaghi, MD is the Founding Chair and Director of the Institute for Neuromodulation and Neurotechnology, Department of Neurosurgery and Neurotechnology, at the University Hospital and University of Tuebingen, Germany. He studies state-dependent, closed-loop brain stimulation paradigms to augment plasticity induction and has contributed to clinical stimulation studies that have redefined treatment guidelines. While establishing novel electrophysiological methods of data acquisition and network analysis during brain stimulation, his clinical and research interests lie in the field of context-specific neuromodulation and closed-loop neuroprosthetics for neurorehabilitation of motor function in neurodegenerative disorders and following brain injury such as stroke.

Monica Perez, PT, Ph.D. is the Scientific Chair of the Arms + Hands Lab at the Shirley Ryan AbilityLab, a Professor in the Department of Physical Medicine and Rehabilitation at Northwestern University, and a Research Scientist at the Edward Jr. Hines VA Hospital. She has studied neural mechanisms contributing to the control of voluntary movement in healthy humans and in people with spinal cord injury for over 15 years. Her research aims to understand how the brain and spinal cord contribute to the control of movement with the ultimate goal of using this mechanistic information to develop more effective rehabilitation therapies for people with spinal cord injury. This theme is mainly investigated from a neurophysiological point of view, using a combination of transcranial magnetic stimulation, magnetic resonance imaging, electrical stimulation, and behavioral techniques.

SPEAKERS / SYMPOSIUM #4

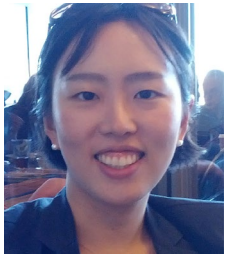
Neural Data Science and Analytics

Ritu Kapur, Ph.D. is the Head of Digital Biomarkers at Verily Life Sciences, a company focused on healthcare by applying scientific and technological advances to significant problems in healthcare. She serves as a cross-functional lead across teams of hardware, software, clinical and data scientists to develop and implement wearable and passive sensing technologies to help better diagnose, monitor, and intervene in disease.

Prior to joining Verily, Dr. Kapur was a Senior Clinical Research Scientist at NeuroPace, and part of the team that successfully completed a PMA for the world's first brain-responsive neurostimulator for the treatment of epilepsy. Dr. Kapur received a Doctorate in Neuroscience from the University of California, San Francisco, where she specialized in signal processing and awake behaving electrophysiology to study the brain systems underlying reward and learning. She graduated cum laude from Stanford University (Human Biology).

Sridevi V. Sarma, Ph.D. received the B.S. degree in electrical engineering from Cornell University, Ithaca NY, in 1994; and an M.S. and Ph.D. degrees in Electrical Engineering and Computer Science from Massachusetts Institute of Technology in, Cambridge MA, in 1997 and 2006, respectively. From 2000-2003 she took a leave of absence to start a data analytics company. From 2006–2009, she was a Postdoctoral Fellow in the Brain and Cognitive Sciences Department at the Massachusetts Institute of Technology, Cambridge. She is now an associate professor in the Institute for Computational Medicine, Department of Biomedical Engineering, at Johns Hopkins University, Baltimore MD.

Her research interests include modeling, estimation and control of neural systems using electrical stimulation. She is a recipient of the GE faculty for the future scholarship, a National Science Foundation graduate research fellow, a L'Oreal For Women in Science fellow, the Burroughs Wellcome Fund Careers at the Scientific Interface Award, the Krishna Kumar New Investigator Award from the North American Neuromodulation Society, and a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE) and the Whiting School of Engineering Robert B. Pond Excellence in Teaching Award.



Sooyoon Shin, Ph.D. is a senior data scientist at Cala Health, a California Bay Area start-up company that came out of the Stanford Biodesign program. Cala Health is a medical technology company pioneering non-invasive wearable therapies that combine peripheral nerve stimulation and sensing modalities to treat chronic disease. Prior to joining Cala Health, Sooyoon was Research Specialist at UCSF where she investigated brain mechanisms of vocal motor production and learning in songbirds.

SPEAKERS / INDUSTRY PANEL

Chris Berka, CEO and Co-Founder of Advanced Brain Monitoring has over 30 years of experience managing clinical research and developing and commercializing new technologies. She is co-inventor of more than 20 patented and PI or Co-Investigator for grants awarded by the National Institutes of Health, DARPA, ONR, OSD, and NSF that provided more than $37 million of research funds to ABM. As CEO of ABM, she leads the research team in projects designed to advance the design, implementation, and validation of novel EEG-based approaches for assessment of neural activity during sleep and waking. Novel empirically and theoretically derived algorithms are featured in her publications on assessing cognition in healthy participants in laboratory and real-world environments and in patients with sleep, psychiatric and neurological diseases. She is an experienced neuroscientist with over 100 publications on the analysis of the EEG correlates of cognition in healthy subjects and patients with sleep and neurological disorders, received her B.A. with distinction in Psychology/Biology at Ohio State University, and completed graduate studies in Neuroscience at UCSD.

Felix Deku, Ph.D. is the Director of Microfabrication and Microfabrication Facility Manager at Neuralink Corp. He previously worked as a Snr. Microfabrication Process Engineer where he developed innovative semiconductor manufacturing processes to meet emerging technology needs. In his role as Director of Microfabrication, Dr. Deku provides technical leadership on thin-film array design innovation, advanced manufacturing technology, electrode material development, characterization and testing, process control and high-volume manufacturing while leading the company to tackle the material challenges of the brain machine interface. His main interests are in the development and characterization of next-generation electrode materials for neural stimulation and recording with particular focus on materials and interfacial engineering. Before joining Neuralink, Dr. Deku demonstrated the development and fabrication of the first intracortical microelectrode arrays based on amorphous silicon carbide. Dr. Deku earned a BS degree in Molecular Biology and Biotechnology from the University of Cape Coast, Ghana and MS and Ph.D. in Biomedical Engineering from The University of Texas at Dallas.

Amy Kruse, Ph.D. is the Founder and President of Sattva Science, LLC. She works closely with organizations of all sizes, empowering teams to advance and realize R&D investments. Her current areas of focus are the application of neuroscience and emerging biotechnology to accelerate human performance optimization and create social change. Dr. Kruse is formerly the Chief Scientific Officer at Optios, an applied neuroscience company. She also served as the VP and Chief Technology Officer at Cubic Global Defense overseeing their R&D portfolio. Dr. Kruse served as a government civilian program manager at the Defense Advanced Research Projects Agency (DARPA) where she created and oversaw the Agency's first performance-oriented portfolio of neuroscience programs. She also coined the term "Operational Neuroscience."

She is a Founding Member of the Loomis Innovation Council at the Stimson Center in Washington DC, a member of DARPA ISAT Study group, an Advisor for Prime Movers Lab and a Guest Lecturer for Singularity University. She is a frequent contributor to panels and boards for organizations including DARPA, the National Academies and the Defense Science Board. She is an internationally recognized and sought-after panelist and keynote speaker, and a member of the All Raise Visionary Voices speakers bureau. She is also the author of numerous scientific papers, chapters, and articles. Dr. Kruse earned a BS in Cell and Structural Biology and a PhD in Neuroscience from the University of Illinois at Urbana-Champaign, where she was awarded an NSF Graduate Fellowship.

Ana Maiques, MBA is the CEO of Neuroelectrics, a company aiming to change the way we interact with the brain, developing innovative technologies to monitor and stimulate the brain to help many patients in need. She was nominated by IESE as one of the most influential entrepreneurs under 40 in Spain (2010) and received the EU Prize for Women Innovators from the European Commission EC in 2014 and one of the Most Inspiring Fifty Women in Europe. Neuro-electrics recently received the Best Start-up in Health 2015 bye Wired UK magazine in an amazing event in London. She now lives in Boston where Neuroelectrics was awarded as one of the 2016 Best Entrepreneurial Companies in USA by Entrepreneur Magazine. She recently joined the European Innovation Council Advisory Board, the pan European organism that aims to scale up European companies.

SPEAKERS / INDUSTRY PANEL

Martha Morrell, MD has been Chief Medical Officer of NeuroPace, Inc. and a Clinical Professor of Neurology at Stanford University since July 2004. Before joining NeuroPace, she was the Caitlin Tynan Doyle Professor of Clinical Neurology at Columbia University and Director of the Columbia Comprehensive Epilepsy Center at New York Presbyterian Hospital in New York City. Previously she was on the faculty of the Stanford University School of Medicine where she served as Director of the Stanford Comprehensive Epilepsy Center. A graduate of Stanford Medical School, she completed residency training in Neurology at the University of Pennsylvania, as well as fellowship training in EEG and epilepsy.

Dr. Morrell has been actively involved in helping to bring new therapies to patients. Her responsibilities at NeuroPace include all clinical and pre-clinical research for a novel responsive neurostimulator for the treatment of medically uncontrolled epilepsy. She has been actively involved in investigational trials of new epilepsy therapies as an academic investigator, and has authored or coauthored more than 150 publications.

Her service to professional societies includes member of the Board of Directors of the American Epilepsy Society, member and Chair of the Board of the Epilepsy Foundation, member of the Council of the American Neurological Association and Chair of the Epilepsy Section of the American Academy of Neurology. She is an elected Ambassador for Epilepsy of the International League Against Epilepsy and received the American Epilepsy Society's 2007 Service Award for outstanding leadership and service. She is the immediate past Chair of the American Society for Experimental Neurotherapeutics.

Brian Pepin, Ph.D. Founder and CEO of Rune Labs. Former engineering lead at Verily. Leadership team for Galvani Verily/GSK bioelectronics joint venture. UC Berkeley Maharbiz lab alumni. Recovering electrical engineer. Second-time founder. Google Search power user.

POSTER SESSION

LANDSCAPE: Morphometric Modeling for Neuromodulation
Hanna Lu, The Chinese University of Hong Kong
Li Zhang, The Chinese University of Hong Kong
Sandra Sau Man Chan, The Chinese University of Hong Kong
Linda Chiu Wa Lam, The Chinese University of Hong Kong

Fractal Analysis of Himalayan Yoga Meditators Using EEG Data
Pankaj Pandey, Indian Institute of Technology Gandhinagar
Krishna Prasad Miyapuram, Indian Institute of Technology Gandhinagar

Neurorehabilitation with Anodal tDCS on Broca and Cathodal tDCS on Its Right Homologue Improves Language in Post-stroke Aphasia: A Series of Cases
Ece Zeynep Karakulak, Istanbul Medipol University
Lütfü Hanoğlu, Istanbul Medipol University

Phase-coherent Stimulation of the Ipsilesional Motor Cortex Reverses Gait Asymmetries After Unilateral Lesion of the Spinal Cord
Elena Massai, Université de Montréal
Marco Bonizzato, Université de Montréal
Marina Martinez, Université de Montréal

Individualized Classification of Working Memory Performance Using Single-Trial Electroencephalography
Mina Mirjalili, Centre for Addiction and Mental Health
Reza Zomorrodi, Centre for Addiction and Mental Health
Zafiris J. Daskalakis, University of California
Sean Hill, Centre for Addiction and Mental Health
Tarek K. Rajji, Centre for Addiction and Mental Health

Lower Limb Rehabilitation after Stroke: Brain-Computer Interface, Electrical Functional Stimulation and Virtual Feedback
Marc Sebastian-Romagosa, g.tec medical engineering Spain S.L.
Woosang Cho, g.tec medical engineering GmbH
Katrin Mayr, g.tec medical engineering GmbH
Christoph Guger, g.tec medical engineering GmbH

Polymer-based Implantable Neural Probe Nanofabrication
Eve McGlynn, University of Glasgow
Rupam Das, University of Glasgow
Vahid Nabaei, University of Glasgow
Hadi Heidari, University of Glasgow

On Augmenting Working Memory through Neurostimulation
Rohith Karthikeyan, Texas A&M University
Ranjana Mehta, Texas A&M University

Predicting Finger Kinematics Across Force Contexts
Matthew Mender, University of Michigan
Samuel Nason, University of Michigan
Matthew Willsey, University of Michigan
Parag Patil, University of Michigan
Cynthia Chestek, University of Michigan

The Neural Port: A Novel Implantable Human-Machine Interface
Connor Glass, Deus Ex Machina Technologies Inc.
Nitish Thakor, Johns Hopkins Department of Biomedical Engineering
Sami Tuffaha, Johns Hopkins Department of Plastic and Reconstructive Surgery

Neurotechnologies for Optimal Human-Machine Collaboration in Decision-Making
Davide Valeriani, Massachusetts Eye and Ear

Low-cost Brain-and-World-Monitoring Eyeglass
Steve Mann, Blueberry
John David Chibuk, Blueberry
Cayden Pierce, Blueberry

A Flexible Real-Time Platform for Adaptive Neuroscience Experiments
Anne Draelos, Duke University
Maxim Nikitchenko, Duke University
Chaichontat Sriworarat, Duke University
Daniel Sprague, Duke University
Matthew Loring, Duke University
Eftychios Pnevmatikakis, Flatiron Institute
Andrea Giovannucci, University of North Carolina
Eva Naumann, Duke University
John Pearson, Duke University

POSTER SESSION

Quantifying Cross-modal Plasticity in the Sight-restored
Negin Nadvar, University of Michigan - Department of Biomedical Engineering
John Jonides, University of Michigan - Department of Psychology
James Weiland, University of Michigan - Department of Biomedical Engineering, Department of Ophthalmology and Visual Sciences

Magnetoelectric Nanoparticles-Based Wireless in Vitro Neuron Stimulation with Sub 100-μm Spatial Differentiation
Ping Liang, CELLULAR NANOMED, INC.
Elric Zhang, University of Miami
Shawnus Chen, CELLULAR NANOMED, INC.
Ian Smith, University of California - Irvine
Audrey Fung, CELLULAR NANOMED, INC.
Manuel Campos, University of Miami
Brayan Navarrete, University of Miami
Isadora Smith, University of Miami
Tyler Nguyen, Indiana University - Purdue University at Indianapolis
Xiaoming Jin, Indiana University - Purdue University at Indianapolis
Sakhrat Khizroev, University of Miami

Magnetic Stimulation of Neuronal Activity in Cortical Slices Using Magneto-Electric Nanoparticles
Tyler Nguyen, Indiana University
Jianhua Gao, Indiana University
Xiaoming Jin, Indiana University
Elric Zhang, University of Miami
Isadora Smith, University of Miami
Ping Liang, CELLULAR NANOMED, INC.
Sakhrat Khizroev, University of Miami

Wearable BCI Camera for Enhanced Memory
Steve Mann, Stanford University
David Eagleman, Stanford University
Ariel Garten, InteraXon
Cayden Pierce, Blueberry
John David Chibuk, Blueberry

Shape Changing Polymer Bilayer for Implanted Flexible Electronics
Muru Zhou, University of Michigan, Ann Arbor
Do Hyun Kang, University of Michigan, Ann Arbor
Jinsang Kim, University of Michigan, Ann Arbor
James Weiland, University of Michigan, Ann Arbor

Challenges of a Bottom-Up Approach to Developing Visually Driven Brain-Computer-Interfaces
Holly Wilson, University of Bath
Michael Proulx, University of Bath
Eamonn O'Neill, University of Bath

BCGNet: A Deep Learning Toolbox for Ballistocardiogram Artifact Suppression in EEG-fMRI Recordings
Jiaang Yao, Columbia University
Yida Lin, Columbia University
James McIntosh, Columbia University
Linbi Hong, Columbia University
Josef Faller, Columbia University
Paul Sajda, Columbia University

A Wireless Network of Microimplants for Neural Recording and Microstimulation
Jihun Lee, Brown University
Ah-Hyoung Lee, Brown University
Vincent Leung, Brown University
Jiannan Huang, Brown University
Peter Asbeck, Brown University
Patrick P. Mercier, Brown University
Stephen Shellhammer, Brown University
Lawrence Larson, Brown University
Farah Laiwalla, Brown University
Arto Nurmikko, Brown University

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